AUG 31 1990
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GRIFFIN INTERNATIONAL

August 29, 1990

Mr. Chuck Schwer
State of Vermont
Department of Environmental Conservation
Petroleum Sites Management Section
103 South Main St.
Waterbury, VT 05676

Dear Chuck:

As per the request of Sharon Campbell, of A.R. Sandri, Inc., I have enclosed a copy of the report on the investigation of petroleum contamination at the Swanton Sunoco. Please, if you have any questions regarding the investigation, call me at (802) 879-7708. Thank you.

Sincerely,

Peter M. Murray
Project Hydrogeologist

REPORT ON THE INVESTIGATION OF SUBSURFACE PETROLEUM CONTAMINATION SWANTON SUNOCO STATION SWANTON, VERMONT

Prepared for:

A.R. Sandri, Inc.
Greenfield, Massachusettes

Prepared by:

Griffin International, Inc.
2B Dorset Lane
Williston, Vermont

Peter M. Murray
Project Geologist

TABLE OF CONTENTS

1.0 INTRODUCTION

This report details the investigation of subsurface petroleum contamination in the vicinity of a recently excavated, underground fuel storage system at the Swanton Sunoco Station in Swanton, Vermont. The investigation has been conducted by Griffin International, Inc for A.R. Sandri, Inc. As the owner of the old tanks, Sandri has been identified as the party responsible for the contamination by the State of Vermont Department of Environmental Conservation who requested that this investigation to be conducted.

2.0 SITE BACKGROUND

2.1 Site Description

The Swanton Sunoco Station is located directly west of Exit 21 of Interstate 89, on the south side of Rt. 78, in the village of Swanton. The surrounding area consists of a mixture of land uses including a shopping center and a gas station on the north side of Rt 78 and a concrete plant immediately west of the Sunoco Station. There are no residences in the immediate vicinity. All buildings, except the Sunoco Station, are served by the Village of Swanton Municipal Water System. The Sunoco Station is served by a drilled well near the southeast corner of the building. Information regarding this well is limited, however, it is assumed that it is a drilled well which is properly cased through the overburden and sealed at the top of bedrock. Currently, water from the well is not used for drinking but is used for the toilets in the rest rooms and for washing.

The subsurface in the immediate area consists of an overburden of silty marine sands overlaying dolomite, marble and limestone bedrock. Surface drainage in the area appears to be poor due to the presence of several swampy areas containing standing water and cat tails. On both dates that Griffin visited the site, sheens were apparent in some of these swampy areas, particularly along the north side of Rt. 78, near the Mobil Station. It was not determined if these sheens were the result of contamination from surface runoff or from subsurface contamination. In any case, these sheens did not seem unordinary considering the proximity to at least three gas stations, several parking lots and two major highways. On both dates that Griffin visisted the site, it was raining heavily. As a result, water levels in the swampy areas appeared to be higher than the yearly average.

Aside from these swampy areas, the nearest surface water to the Sunoco Station is a small stream approximately 100 feet to the west. This stream flows into the Mississquoi River approximately one half mile to the south of the station. No apparent petroleum contamination was entering the stream on the dates which Griffin visited the site.

2.2 Site History

On April 18th, 1990, four underground storage tanks were removed from the tank pit (see "Old Tank Pit" on the Site Map in Appendix A) on the western side of the property. Three of the tanks were 6,000 gallon gasoline tanks. The remaining tank was a 550 gallon waste oil tank. In addition to these four tanks, one 550 gallon fuel oil tank was removed from the vicinity of the new tank pit.

Upon excavation of the three gasoline tanks, a noticeable hole was discovered in one of the tanks. This tank was then found to contain mostly water which was filtered through activated charcoal and placed back in the tank pit. The other two gasoline tanks showed no signs of leaking. The soils beneath the waste oil tank appeared to be stained with petroleum. It is assumed that the staining beneath this tank was the result of spillage of a small amount of waste oil during excavation of the tank. No signs of petroleum contamination were detected near the fuel oil tank.

A total of approximately 150 yards of contaminated soils were removed from the vicinity of the old tank pit. These soils are currently stock piled on plastic at the western edge of the property. The excavated areas were then refilled with clean soils from the new tank pit and with clean fill brought in from off site.

On May 28th, The Vermont D.E.C. requested that Sandri contract a consultant to perform a site assessment to determine the extent of the petroleum contamination and to identify potential receptors of the contamination. Sandri contracted Griffin to conduct the assessment on July 9th. The assessment was begun on July 20th.

3.0 INVESTIGATIVE PROCEDURES

3.1 Monitoring Well Installation

On July 20th, Griffin installed three groundwater monitoring wells in the vicinity of the old tank pit. The wells were installed using a hollow stem auger drill rig, supervized by the Griffin hydrogeologist. The hydrogeologist collected soil samples from each borehole using the split spoon and from the auger flights. The soils were logged and screened for hydrocarbon vapors using a portable photoionization device. Soil descriptions and hydrocarbon vapor levels are listed in the well logs in Appendix B.

Each well was drilled to a depth of twelve feet below grade. The wells were constructed of ten feet of 2" PVC well screen and two feet of PVC casing. Gravel packs were installed around each screen to prevent the infiltration of fine sediments into the wells. Bentonite seals were installed above each gravel pack to prevent contamination of the groundwater from surface runoff. Each well was completed with an eight inch diameter, bolt-down manhole cover, clearly marked "monitoring well".

MW-1 was installed in a location which was originally assumed to be upgradient of the old tank pit. Soils retrieved from this well consisted of fine to coarse sand and silt near the surface and fine sand and silt at depths greater than three feet. No petroleum odors were noticed in these soils but the photoionizer did detect 0.5 ppm hydrocarbon vapors in soils retrieved from the water table, at a depth of approximately five feet.

MW-2 was installed as a downgradient well to the old tank pit. Soils retrieved from this well consisted of fine sand and silt. Slight petroleum odors, measured at 1.5 ppm by the photoionizer, were detected in the soils retrieved from the water table to a depth of approximately seven feet.

MW-3 was also installed as a downgradient well to the old tank pit. Soils retrieved from this well also consisted of fine sand and silt. A noticeable petroleum odor, measured at 5 ppm by the photoionizer, was detected at the water table. At a depth of approximately ten feet, hydrocarbon vapor levels in the soil were measured at 0.5 ppm.

3.2 Groundwater Gradient and Flow Direction Determination

To measure the groundwater gradient and flow direction in the vicinity of the old tank pit, Griffin surveyed the relative elevations of the tops of casings of the three monitoring wells and assigned the top of casing of MW-1 an arbitrary elevation of 100'. The depths to groundwater were then measured in each of the wells to determine water table elevations in each well. The Groundwater Contour Map, in Appendix A, illustrates the water table elevations in the vicinity of the tank pit.

The contour map indicates that the water table is dipping to the southwest at a 1.2% gradient. This indicates that the groundwater was flowing to the southwest on the monitoring date, July 23rd. It is possible, however, that the groundwater flow direction may change in response to seasonal groundwater recharge rates.

Due to the fine silty nature of the sands and to the relatively slight water table gradient, it is not expected that groundwater flow rates would be rapid in the immediate vicinity of the Swanton Sunoco Station.

3.3 Groundwater Sampling and Analysis

On July 23rd, Griffin collected groundwater samples from each of the three on-site monitoring wells for analysis for BTEX and MTBE, using EPA Method 602. Prior to sampling each well, up to five well volumes were evacuated to ensure that the samples were representitive of groundwater in the surrounding formation. The samples were collected using a clean teflon bailer which was thoroughly cleaned prior to collecting each sample.

The lab results in Appendix C indicate that there were concentrations of purgeable aromatic compounds in each of the three monitoring wells on the sampling date. Each of the three wells contained varying concentrations of benzene, toluene, ethylbenzene, xylenes and MTBE. The presence of these compounds in the groundwater indicates that the subsurface petroleum is the result of a release or releases of gasoline to the subsurface.

The BTEX and MTBE in Groundwater Map, in Appendix A, illustrates the distribution of these compounds in the groundwater. There appears to be an area of BTEX and MTBE contamination with concentrations greater than 10 ppm centered near the northeast end of the old tank pit. MW-3, which contained 11.37 ppm total

BTEX and MTBE, is within this area. The other two wells, MW-1 and MW-2 lie within an area that contains between 5 ppm and 10 ppm total BTEX and MTBE. The inferred limit of groundwater containing contamination concentrations greater than 1 ppm is indicated by the dashed contour line. The nearly symmetrical configuration of the contamination plume may indicate that the water table is nearly horizontal, as the groundwater contour map suggests, and that groundwater flow rates accross the site are relatively slow. Additionally, the inferred 1 ppm contour line does not extend to properties adjacent to the Sunoco Station, indicating that the contamination plume has likely not migrated off site.

4.0 CONCLUSIONS

Based on the available data, Griffin International has reached the following conclusions regarding the subsurface conditions at the Swanton Sunoco Station:

1. The subsurface in the vicinity of the Sunoco Station consists of mostly fine, silty sand which likely has a low overall permeability.

2. The water table in the vicinity of the old tank pit was dipping to the southeast at a 1.2% gradient on July 23rd, 1990. It is possible that, as groundwater recharge rates change seasonally, groundwater flow direction reverses and flows towards drainage ditches to the northwest, north and northeast of the property. The relatively large amount of rainfall during the summer of 1990 may have raised standing water levels in these ditches above the normal water table, thereby temporarily changing groundwater flow direction.

3. Due to the fine silty nature of the sands and to the slight groundwater gradient, it is likely that the permeability and groundwater flow rates accross the site are relatively low.

4. Varying concentrations of BTEX and MTBE were detected in samples of groundwater from each of the three on-site monitoring wells collected on July 23rd. The area with the highest concentrations appears to be centered near the northeast end of the tank pit. Concentrations in this area exceed 10 ppm. From available data, we are assuming that concentrations of BTEX and MTBE, greater than 1 ppm, do not extend beyond a fourty-five foot radius from the old tank pit.

5. Due to the presence of BTEX and MTBE in the groundwater, it is apparent that the petroleum contamination is a result of an inadvertant release or releases of gasoline to the subsurface. The likely sources of the contamination are the piping beneath the pump island and a hole in one of the excavated gasoline tanks. The amount and duration of the release or releases are not known, however, all likely sources have since been removed.

6. The contamination is present in both the dissolved and adsorbed phases. No free floating product has been observed during this investigation.

7. Because all homes and businesses in the area, except the Swanton Sunoco Station, are served by the municipal water system, it is unlikely that the subsurface contamination, which has likely not migrated off-site, will affect persons occupying these buildings. The Sunoco Station is supplied by a drilled well at the southeast corner of the building. Although data concerning this well is limited, it is assumed that the well is cased through the overburden and drilled into bedrock. If the casing is properly sealed at the top of bedrock, it is unlikely that the petroleum contamination will enter the well. If the well is not properly cased, pumping of water from it could result in a drawdown of contamination into the bedrock aquifer. Currently, the well is not used for drinking water.

8. As the subsurface contamination in the vicinity of the old tank pit is continuously subjected to the natural processes of dilution, dispertion and degradation, concentrations will eventually be reduced to below detectable limits.

5.0 RECOMMENDATIONS

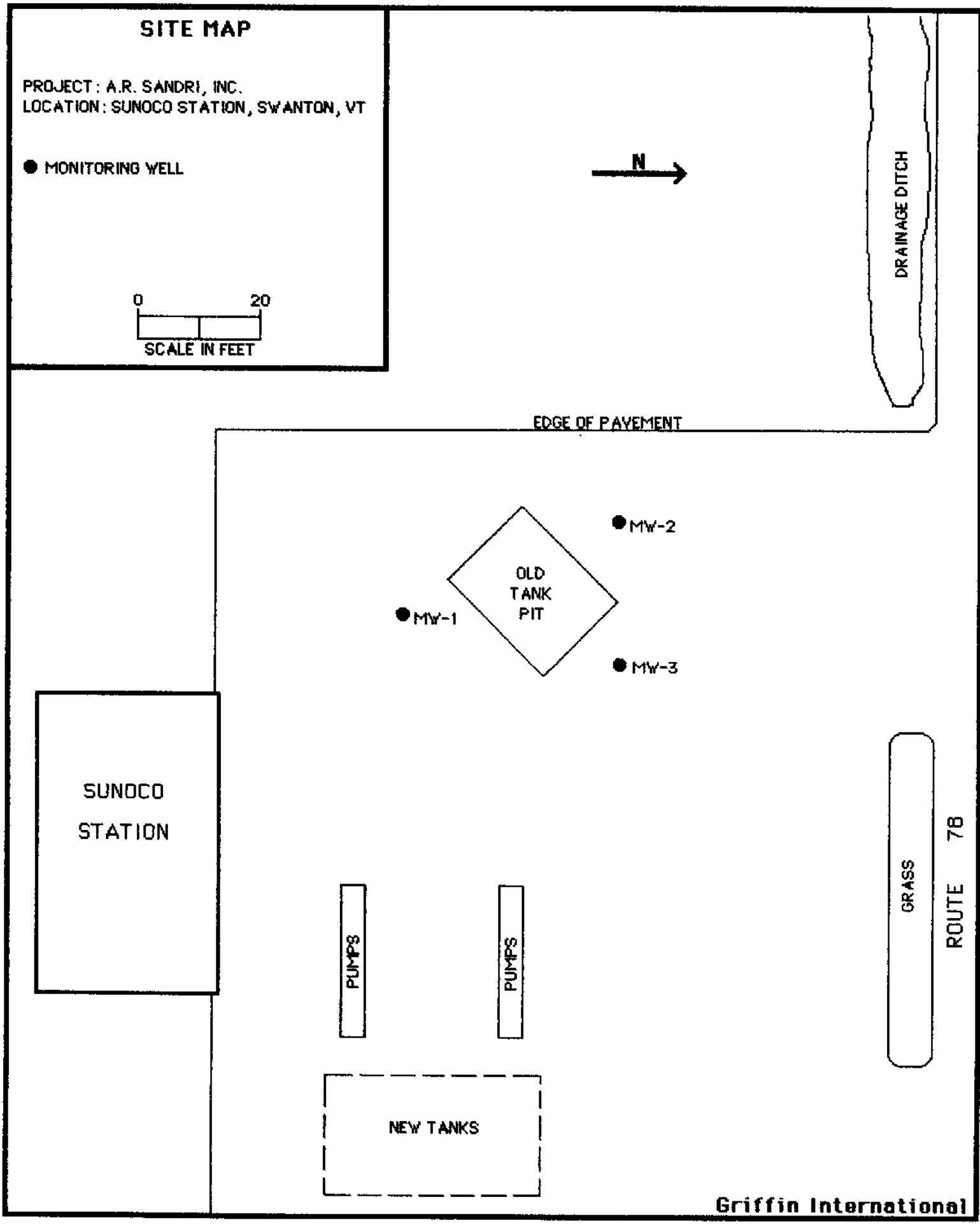
Based on the above conclusions, Griffin International presents the following recommendations with regard to the subsurface petroleum contamination at the Swanton Sunoco Station:

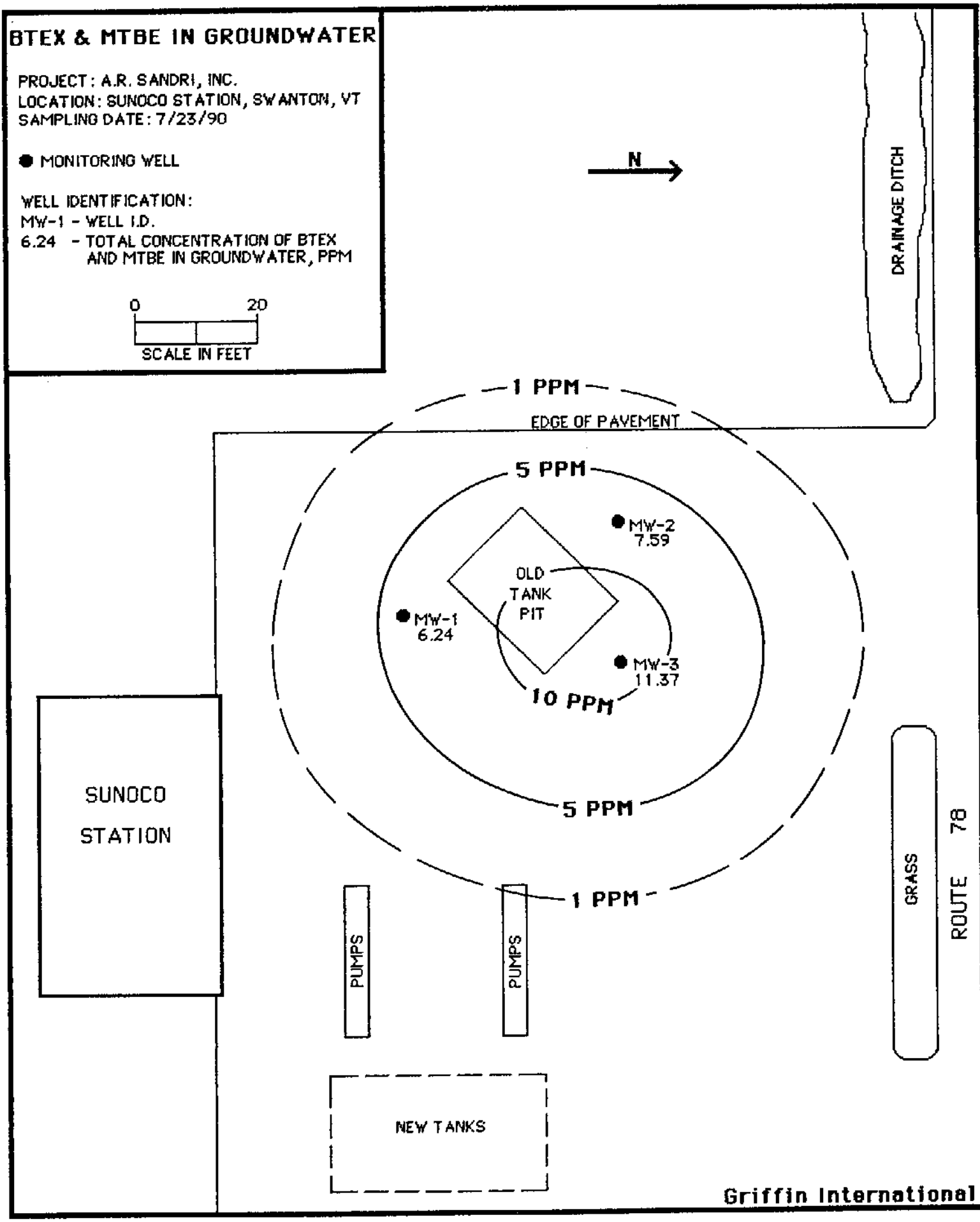
1. To properly monitor the subsurface petroleum contamination in the vicinity of the old tank pit, we recommend regular sampling of the on-site groundwater monitoring wells for visual inspection for obvious signs of contamination, such as odors, sheens and free floating product. Records of sampling should be kept in a log for verification. The sampling can be performed by Sandri or Swanton Sunoco employees.

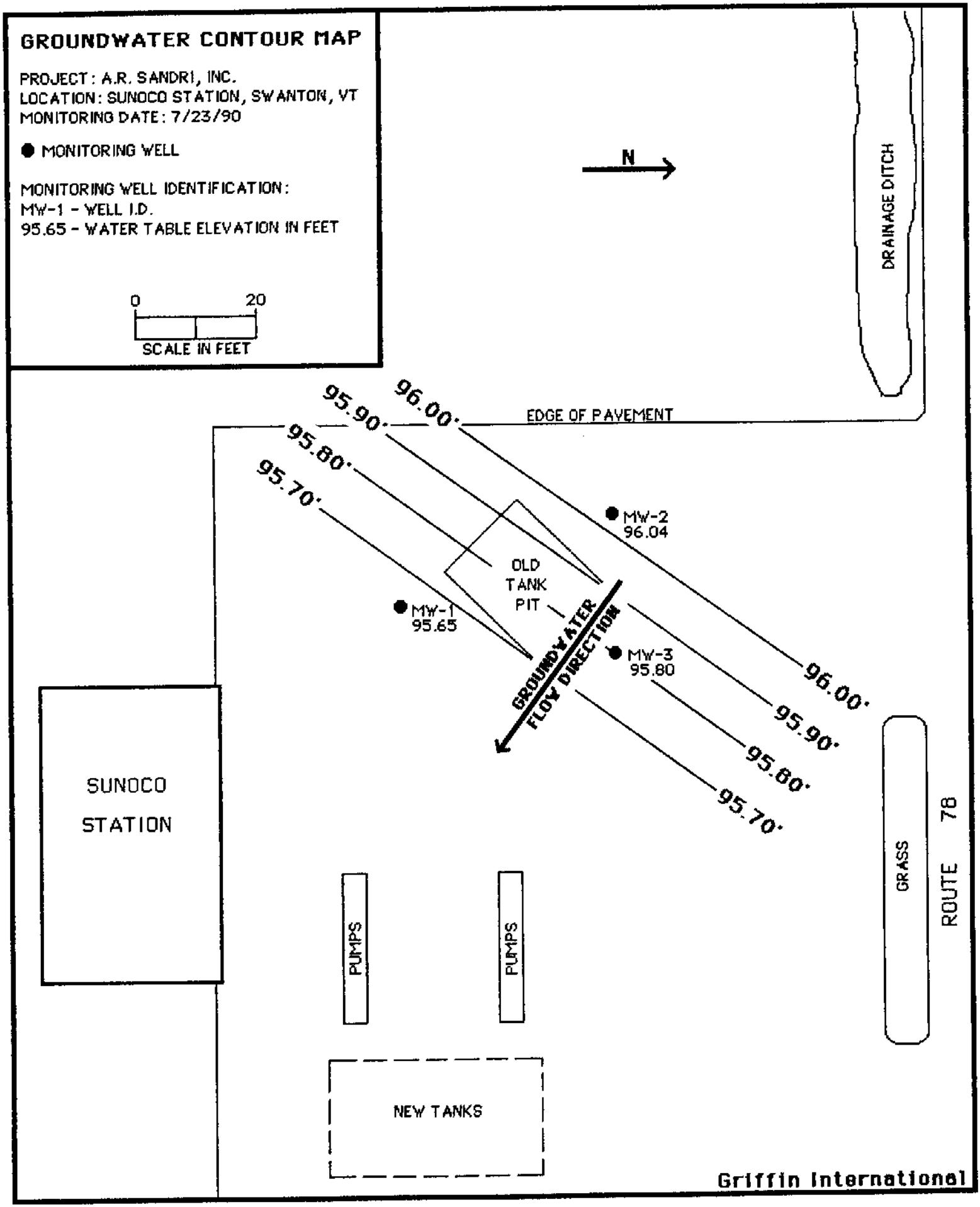
2. If significant contamination appears in these wells, we recommend that a strategy to mitigate the contamination be implemented.

APPENDIX A

Site Maps


SITE MAP
PROJECT: A.R. SANDRI, INC.
LOCATION: SUNOCO STATION, SWANTON, VT
MONITORING WELL
0
20
SCALE IN FEET
N
DRAINAGE DITCH
EDGE OF PAVEMENT
MW-2
OLD
TANK
PIT
MW-1
MW-3
SUNOCO
STATION
PUMPS
PUMPS
GRASS
ROUTE 78
NEW TANKS
Griffin International


BTEX & MTBE IN GROUNDWATER
PROJECT: A.R. SANDRI, INC.
LOCATION: SUNOCO STATION, SWANTON, VT
SAMPLING DATE: 7/23/90
MONITORING WELL
WELL IDENTIFICATION:
MW-1 - WELL I.D.
6.24 - TOTAL CONCENTRATION OF BTEX AND MTBE IN GROUNDWATER, PPM
0
20
SCALE IN FEET
N
DRAINAGE DITCH
1 PPM
EDGE OF PAVEMENT
5 PPM
MW-2
7.59
OLD
TANK
PIT
MW-1
6.24
MW-3
11.37
10 PPM
5 PPM
1 PPM
SUNOCO
STATION
PUMPS
PUMPS
GRASS
ROUTE 78
NEW TANKS
Griffin International


GROUNDWATER CONTOUR MAP
PROJECT: A.R. SANDRI, INC.
LOCATION: SUNOCO STATION, SWANTON, VT
MONITORING DATE: 7/23/90
MONITORING WELL
MONITORING WELL IDENTIFICATION:
MW-1 - WELL I.D.
95.65 - WATER TABLE ELEVATION IN FEET
0
20
SCALE IN FEET
N
DRAINAGE DITCH
EDGE OF PAVEMENT
96.00'
95.90'
95.80'
95.70'
MW-2
96.04
OLD
TANK
PIT
MW-1
95.65
MW-3
95.80
GROUNDWATER
FLOW DIRECTION
SUNOCO
STATION
PUMPS
PUMPS
NEW TANKS
GRASS
ROUTE 78
Griffin International

APPENDIX B

Well Logs

PROJECT A.R.SANDRI, INC.

LOCATION SWANTON, VERMONT

DATE DRILLED 7/20/90 TOTAL DEPTH OF HOLE 12'

DIAMETER 6"

SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"

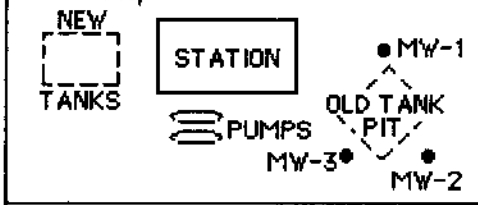
CASING DIA. 2" LENGTH 2" TYPE PVC

DRILLING CO. GTI DRILLING METHOD HOLLOW STEM AUGER

DRILLER JACK BERNHARDT LOG BY PETER MURRAY

WELL NUMBER MW-1

Sketch Map



RT. 78

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0–26	ROAD BOX; CONCRETE CAP; WELL CASING; BENTONITE; WELL SCREEN; GRAVEL PACK; BOTTOM CAP		5'-7': 3,2,3,4	Fine to coarse SAND, some gravel, little silt NO PETROLEUM ODOR WATER TABLE ▼ NO PETROLEUM ODOR < 0.5 PPM Wet, gray, fine SAND and SILT BASE OF EXPLORATION AT 12'

Griffin International

PROJECT A.R.SANDRI, INC.

LOCATION SWANTON, VERMONT

DATE DRILLED 7/20/90 TOTAL DEPTH OF HOLE 12'

DIAMETER 6"

SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"

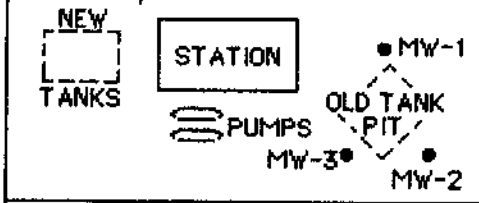
CASING DIA. 2" LENGTH 2" TYPE PVC

DRILLING CO. GTI DRILLING METHOD HOLLOW STEM AUGER

DRILLER JACK BERNHARDT LOG BY PETER MURRAY

WELL NUMBER MW-2

Sketch Map



RT. 78

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX		
1		CONCRETE CAP		
2		WELL CASING		Fine, brown silty SAND
3		BENTONITE		NO PETROLEUM ODOR
4		WELL SCREEN	4'-6': 6,8,12,12	Fine, gray SAND and SILT
5				WATER TABLE
6				
7		GRAVEL PACK		Wet, fine, gray SAND and SILT
8				SLIGHT PETROLEUM ODOR 1.5 PPM
9				
10				
11				
12		BOTTOM CAP		BASE OF EXPLORATION AT 12'
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

Griffin International

PROJECT A.R.SANDRI, INC.

LOCATION SWANTON, VERMONT

DATE DRILLED 7/20/90 TOTAL DEPTH OF HOLE 12'

DIAMETER 6"

SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"

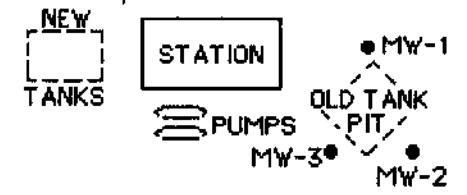
CASING DIA. 2" LENGTH 2" TYPE PVC

DRILLING CO. GTI , DRILLING METHOD HOLLOW STEM AUGER

DRILLER JACK BERNHARDT LOG BY PETER MURRAY

WELL NUMBER MW-3

Sketch Map



RT. 78

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0–26	ROAD BOX; CONCRETE; CAP; WELL CASING; BENTONITE; WELL SCREEN; GRAVEL PACK; BOTTOM CAP		4' - 6': 3,6,8,5	Fine, brown, silty SAND SLIGHT PETROLEUM ODOR AT 3' < 3 PPM WATER TABLE ▼ 5 PPM Wet, fine, gray SAND and SILT 0.5 PPM BASE OF EXPLORATION AT 12'

Griffin International

APPENDIX C

Laboratory Results

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin Internatinal
PROJECT NAME: Swanton Sunoco
REPORT DATE: July 27, 1990 — DATE RECEIVED: July 23, 1990
ANALYSIS DATE: July 25, 1990 — REF.#: 13,425
DATE SAMPLED: July 23, 1990 — STATION: Swanton Sunoco MW #1
SAMPLER: Don Tourangeau — TIME SAMPLED: 10:20

Parameter	Concentration (ug/L)[1]
Benzene	665.
Chlorobenzene	ND[2]
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	145.
Toluene	70.5
Xylenes	616.
MTBE	4,740.

NUMBER OF UNIDENTIFIED PEAKS FOUND: 3

NOTES:

1 Method 602 detection limit is 1 ug/L
2 None detected

Reviewed by Suzanne M. Hennessy

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin Internatinal
PROJECT NAME: Swanton Sunoco
REPORT DATE: July 27, 1990 DATE RECEIVED: July 23, 1990
ANALYSIS DATE: July 25, 1990 REF.#: 13,426
DATE SAMPLED: July 23, 1990 STATION: MW #2
SAMPLER: Don Tourangeau TIME SAMPLED: 10:40

Parameter	Concentration (ug/L)[1]
Benzene	1,860.
Chlorobenzene	ND[2]
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	432.
Toluene	1,640.
Xylenes	1,960.
MTBE	1,700.

NUMBER OF UNIDENTIFIED PEAKS FOUND: 4

NOTES:

1 Method 602 detection limit is 1 ug/L
2 None detected

Reviewed by Eugene M. Mancini

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin Internatinal
PROJECT NAME: Swanton Sunoco
REPORT DATE: July 27, 1990 — DATE RECEIVED: July 23, 1990
ANALYSIS DATE: July 25, 1990 — REF.#: 13,427
DATE SAMPLED: July 23, 1990 — STATION: MW #3
SAMPLER: Don Tourangeau — TIME SAMPLED: 10:55

Parameter	Concentration (ug/L)[1]
Benzene	1,960.
Chlorobenzene	ND[2]
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	743.
Toluene	2,810.
Xylenes	3,280.
MTBE	2,580.

NUMBER OF UNIDENTIFIED PEAKS FOUND: 6

NOTES:

1 Method 602 detection limit is 1 ug/L
2 None detected

Reviewed by Eugene M. Fennell

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin Internatinal
PROJECT NAME: Swanton Sunoco
REPORT DATE: July 27, 1990 DATE RECEIVED: July 23, 1990
ANALYSIS DATE: July 25, 1990 REF.#: 13,428
DATE SAMPLED: July 23, 1990 STATION: Field Blank
SAMPLER: Don Tourangeau TIME SAMPLED: 11:05

Parameter	Concentration (ug/L)[1]
Benzene	ND[2]
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
MTBE	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 Method 602 detection limit is 1 ug/L
2 None detected

Reviewed by Suzanne M. Fowler